

## CHAPTER 5

# 5.0 MANAGEMENT AND MONITORING OF DREDGED MATERIAL DISPOSAL AND REUSE SITES

### 5.1 INTRODUCTION

This chapter focuses on the details of management and monitoring for in-Bay disposal sites, the deep ocean disposal site, and beneficial reuse sites. Chapter 5 discusses the sediment testing required for suitability determinations prior to dredging or disposal, a key part of site management. Specific recommendations for modifications of the existing monitoring framework are not included in this chapter, because additional time is needed to evaluate existing data and

monitoring and management practices. The next three-year cycle should include more active management of the in-Bay disposal sites and it is expected that any additional monitoring requirements for the in-Bay sites will be identified during this period and incorporated in a future revision of the LTMS Management Plan (Management Plan), and possibly in amendments to the Bay Conservation and Development Commission (BCDC) Bay Plan and the San Francisco Bay Regional Water Quality Control Board (SFBRWQCB) Basin Plan.

The U.S. Army Corps of Engineers (USACE) monitors and manages the in-Bay disposal sites, but there is no formal disposal site management and monitoring plan (SMMP) for these sites. A work group has been meeting since the fall 1999 (see Section 5.4.4), with the goal of developing formal SMMPs for the in-Bay sites. Section 5.5 describes current management and monitoring at the in-Bay sites and the progress of the work group to date. Section 5.5 describes the SMMP already in place for San Francisco Deep Ocean Disposal Site (SF-DODS). General SMMPs for beneficial reuse sites do not exist because site and project characteristics are so varied. For the near future, SMMPs for beneficial reuse sites will be developed on a case-by-case basis, based on the project environment. The SMMP work group will discuss developing general guidance for beneficial reuse site SMMPs, based on data and lessons learned from past and current projects. Beneficial reuse site SMMPs are discussed in Section 5.6. Table 5.1, below, provides a summary of existing and probable monitoring requirements for the three disposal environments.

#### Disposal Site Monitoring and Management

- Three disposal environments - in-Bay, ocean, and beneficial reuse
- Management and monitoring for in-Bay sites is based on the premise that sites are predominantly dispersive
- Site management and monitoring for SF-DODS is already established
- Management and monitoring for beneficial reuse sites will be determined case by case and will be specific to the project environment

**Table 5.1**  
**Current and Future Monitoring Requirements**  
**for the Three Different Disposal**  
**and Beneficial Reuse Environments**

	<i>Disposal or Beneficial Reuse Location</i>		
<b>Monitoring Type</b>	<b>In-Bay</b>	<b>Deep Ocean</b>	<b>Beneficial Reuse</b>
Bathymetry	R	R	NA
Material type	R		P
Chemical testing <sup>1</sup>	R	R	R
Chemical testing <sup>2</sup>	H	R	P
Benthic studies	N	R	P
Pelagic studies	N	R	NA
Water column	R	R	P
Volume tracking	R	R	R
Dredging method	R	?	P
Salinity	NA	NA	M

R= Currently required

P = Probably required in the future

H = Historical (has been done, but is not required)

M = May be required, site dependent

NA = Not applicable

N = Not required

## 5.2 IMPLEMENTATION MEASURES

### 5.2.1 Development of Site Monitoring and Management Plans for Disposal and Beneficial Reuse Options

- As previously stated in the LTMS EIS/EIR, “[t]he LTMS agencies will develop and implement site management and monitoring plans (SMMPs) for all multi-user placement or disposal sites. These plans will specify the site use parameters necessary to ensure that impacts are minimized and/or benefits are realized. The plans will also specify the monitoring requirements and post-closure activities as appropriate for each site. Site management and monitoring plans will identify specific conditions that would constitute acceptable performance, as well as adjustments to site use parameters (including termination of continued site use) that would be triggered by specific findings of non-performance.” The LTMS agencies will continue to sponsor the effort of the management and monitoring work

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<sup>1</sup> Prior to dredging

<sup>2</sup> In-situ confirmation

group through the end of 2002, which will serve as a vehicle for developing management and monitoring plans.

- As previously stated in the LTMS EIS/EIR, “[t]he LTMS agencies will provide opportunity for public input and comment on proposed site management and monitoring plans for new disposal or placement sites and on proposed substantive revisions to existing plans. Information from site monitoring efforts will be made available to the public, and opportunity for comment will also be provided as part of the periodic review for existing sites.”

#### 5.2.2 Continuation of Current Management and Monitoring Practices for in-Bay Disposal Sites Pending Adoption of Formal Site Management and Monitoring Plans

- Until formal site management and monitoring plans are adopted for the in-Bay disposal sites, the current management and monitoring practices will be continued. The LTMS agencies anticipate that formal SMMPs will be adopted in time for inclusion in the first three-year revision of the Management Plan.

### 5.3 IMPORTANCE OF SITE MONITORING AND MANAGEMENT PLANS

SMMPs for disposal and beneficial reuse sites are necessary to ensure proper management of sites, to minimize the potential for adverse environmental impacts, and to ensure compliance with laws, regulations, and permit conditions. Public input into the development of such plans is critical to ensuring that concerns are addressed. The LTMS agencies recognize the importance of such plans and the importance of public input into their development. Therefore, the LTMS agencies adopt the implementation measures below.

- As previously stated in the LTMS EIS/EIR, “[t]he LTMS agencies will develop and implement site management and monitoring plans for all multi-user placement or disposal sites. These plans will specify the site use parameters necessary to ensure that impacts are minimized and/or benefits are realized. The plans will also specify the monitoring requirements and post-closure activities as appropriate for each site. Site management and monitoring plans will identify specific conditions that would constitute acceptable performance, as well as adjustments to site use parameters (including termination of continued site use) that would be triggered by specific findings of non-performance.” The LTMS agencies will continue to sponsor the effort of the management and monitoring work group through the end of 2002, which will serve as a vehicle for developing management and monitoring plans.
- As previously stated in the LTMS EIS/EIR, “[t]he LTMS agencies will provide opportunity for public input and comment on proposed site management and monitoring plans for new disposal or placement sites and on proposed substantive revisions to existing plans. Information from site monitoring efforts will be made available to the public, and opportunity for comment will also be provided as part of the periodic review for existing sites.”

## 5.4 IN-BAY DISPOSAL SITE MANAGEMENT AND MONITORING

There are no formal SMMPs in place for any of the in-Bay disposal sites. The U.S. Army Corps of Engineers (USACE) currently manages the sites and performs monitoring activities, some of which are required by SFBRWQCB Order No. 99-030. The USACE and the dredging community provide funding and in-kind services for additional off-site monitoring. The following sections describe current management and monitoring of the in-Bay disposal sites, the costs of current management and monitoring efforts, and describe the status of a work group (SMMP work group) that is developing formal SMMPs for each of the three in-Bay disposal sites.

- Until formal site management and monitoring plans are adopted for the in-Bay disposal sites, the current management and monitoring practices will be continued. The LTMS agencies anticipate that formal SMMPs will be adopted in time for inclusion in the first three-year revision of the Management Plan.

### 5.4.1 Management of the In-Bay Disposal Sites

Many of the management practices at the in-Bay disposal sites are designed to maximize dispersion of materials from the disposal sites primarily to preclude mounding and, thus, navigation hazards at the sites. Management practices for all three disposal sites are listed below.

- Monthly and annual targets on disposal volumes at the sites. The Bay Plan and Basin Plan place monthly and annual targets on the amount of material that may be disposed of at each of the three disposal sites.
- Limits on type of material disposed of at sites. Only unconsolidated dredged material with sandy or smaller grain sizes may be disposed of at the in-Bay disposal sites. Gravel, rocks, consolidated materials, and debris may not be disposed of at the sites. Typically material from maintenance dredging projects is unconsolidated and meets this requirement. Material from new work projects is often consolidated and may not meet this requirement.

A large mound has developed at the Alcatraz site (SF-11), which has, at times, grown so large as to be a navigation hazard. Additional management measures have been taken at this site in order to deal with the problem.

- Lower monthly volume target at Alcatraz site. Based on experience with managing the site, the USACE determined that the monthly target for the Alcatraz site (from the Bay Plan and Basin Plans) was not low enough to prevent build-up of dredged material at the site. Therefore, USACE imposed a lower monthly target, via Public Notice 93-3 (Appendix P).
- Management of disposal locations within the Alcatraz site. Dredgers disposing of dredged material at the Alcatraz site are directed to specific quadrants to enhance dispersion of material from the site.

- Management of disposal locations for hopper and clamshell dredged material. Because material dredged by clamshell is typically more consolidated and, therefore, less dispersive than material dredged by hopper dredges, clamshell material is directed to different areas of the disposal site. More dispersive hopper-dredged material is directed to different areas so that this material will not be buried in place by subsequent disposal of more consolidated clamshell material.
- Corrective action in the event of navigation hazard. On several occasions in the early 1980s, a portion of the Alcatraz site became shallow enough to pose a hazard to navigation. On these occasions, the USACE took corrective action by dredging the shallowest part of the mound, sidecasting the dredged material at deeper portions of the site. In 1992, mounding was again noted and monthly targets were set by PN 93-3, which also set a more frequent bathymetric monitoring schedule for the site. In 1999, mounding problems were again noted. In response, the USACE temporarily prohibited disposal at certain areas within the site.

Because the material disposed of at the in-Bay disposal sites expected to be dispersed throughout the Bay, management measures are also designed to ensure that these dispersed materials will not cause adverse environmental impacts as they move through the Bay. The following management practice is implemented for all three in-Bay disposal sites.

- Determination of sediment suitability for aquatic disposal prior to authorization of in-Bay disposal. As described in Chapter 4, part of the regulatory process for dredging and in-Bay disposal projects is a determination of sediment suitability for the proposed disposal environment. This determination is made by the regulatory agencies, as described in Chapter 4, and relies on results of physical, chemical, and biological analyses of the sediments proposed for dredging. All projects proposing to use the in-Bay disposal sites are reviewed via this process, and only sediments deemed to be suitable for unconfined aquatic disposal are disposed of at the in-Bay sites.

#### 5.4.2 Monitoring of the in-Bay Disposal Sites

The two main areas of focus for monitoring the in-Bay disposal sites are tracking of disposal volumes and bathymetric monitoring at the sites to assess possible navigation hazards and off-site monitoring to assess impacts of in-Bay disposal to the Bay as a whole. In addition, other efforts provide information on conditions at the disposal sites and on larger-scale impacts of the sites.

The USACE tracks the volume of dredged material that is placed at the disposal sites, to ensure that disposal volume targets for each site are not exceeded. Bathymetric mapping occurs on a monthly basis at the Alcatraz disposal site (SF-11), on a quarterly basis at the San Pablo Bay (SF-10) and the Carquinez (SF-09) sites, and on an as-needed basis at the Suisun Channel site.

Off-site monitoring of the impacts of in-Bay disposal occur through the San Francisco Bay Regional Monitoring Program for Trace Substances (RMP). This program is designed to evaluate trends in sediment and water quality for the Bay as a whole, with the intent of looking at aggregate impacts on the Bay, rather than the impacts of any individual activity. Data from the

RMP provide our best estimate of ambient conditions in the Bay and can be used to evaluate whether disposal activities are having significant impacts at a regional scale. The program is funded through fees imposed on Bay Area dischargers. For users of the in-Bay disposal sites, a per cubic yard fee is collected for this program. This fee is in addition to any permitting fees imposed by the regulatory agencies. In lieu of paying the RMP fee, the USACE supports the program by providing in-kind services via the U. S. Geological Survey (USGS).

There are other sources of information on the condition and impacts of the in-Bay disposal sites, in addition to the efforts geared specifically to monitoring the in-Bay disposal sites. The protocol for testing sediments to determine suitability requires that sediments proposed for dredging be compared to sediments at the proposed disposal site. Most testing data submitted to the Dredged Material Management Office (DMMO) as part of the sediment suitability determination process include results of physical, chemical, and biological analyses of sediments at (or, in the case of the Alcatraz disposal site, near) the disposal site. These data provide information on conditions at the site and could be used to trigger changes in site management.

Other special studies can provide information on conditions at or impacts of the in-Bay disposal sites. For example USGS research staff used data collected for a broad-scale study on suspended sediments in San Francisco Bay to determine if dredging and disposal operations in San Pablo Bay caused a statistically significant change in water-column concentrations of suspended solids. Periodically the USACE has conducted tracking exercises to evaluate the relationship of the mound bathymetry to disposal rate and has funded at least one study of the behavior of clamshell and hopper dredge material over several months after disposal. The LTMS agencies have directed many studies on potential environmental impacts of dredging and disposal on the Bay.

#### 5.4.3 Costs of Current Monitoring and Management Efforts

The operator of the largest dredging projects in the Bay, the USACE, currently provides the largest portion of management and monitoring costs for the in-Bay disposal sites. In recent years the USACE has spent approximately \$150,000 per year on monitoring and reporting at the in-Bay disposal sites, and a \$250,000 annual in-kind contribution to fund USGS studies that are included in the RMP. Monitoring costs for non-federal dredging projects is currently limited to participation in the RMP, with the dredging community fees contributing between \$200,000 and \$250,000 to the RMP annually.

#### 5.4.4 SMMP Work Group

The LTMS agencies, in the LTMS EIS/EIR committed to developing formal SMMPs for each of the in-Bay disposal sites. Through the Management Plan workshops, a work group was formed to address this task. This work group, the SMMP work group, began meeting in September 1999, and consisted of agency staff and interested parties, including members of the environmental and dredging communities.

At the time of this writing, the work group is still early in the process of developing SMMPs. Efforts to date have included reviewing information to identify the state of knowledge about

potential environmental impacts of concern (details of this review are provided in Appendix H), and reviewing frameworks that have been used in other locations for developing SMMPs.

The SMMPs are expected to include specific monitoring requirements, as well as other site use constraints (e.g., environmental windows restricting disposal, monthly and yearly volume limits, controls on turbidity). The SMMPs will specify when and what type of monitoring are required. The SMMPs may also identify, as appropriate, measures that will reduce adverse environmental impacts associated with dredged material disposal to acceptable levels within the disposal site and to minimize the potential for adverse impacts beyond the boundaries of the site. The SMMPs may also include management measures for specific disposal practices or material types to maximize dispersion of the approved material. The SMMPs may also recommend enforcement mechanisms in the event that disposal operations do not conform to requirements.

#### 5.4.5 Interim Procedures for Management and Monitoring of In-Bay Disposal Sites

The LTMS agencies will adopt the following implementation measure for in-Bay disposal site monitoring and management during the development of formal SMMPs for the in-Bay disposal sites.

- Until formal site management and monitoring plans are adopted for the in-Bay disposal sites, the current management and monitoring practices will be continued. The LTMS agencies anticipate that formal site management and monitoring plans will be adopted in time for inclusion in the first three-year revision of the Management Plan.

### 5.5 SF-DODS MANAGEMENT AND MONITORING

#### 5.5.1 SF-DODS Management

Management of SF-DODS is the responsibility of the Regional Administrator of U.S. Environmental Protection Agency (USEPA), in cooperation with the USACE South Pacific Division Engineer and the San Francisco District Engineer. Before disposal of any dredged material at the SF-DODS may occur, USEPA and USACE must evaluate the proposed project according to the Ocean Dumping Criteria adopted pursuant to the Marine Protection Research and Sanctuaries Act (MPRSA). USEPA or USACE will not allow ocean disposal of material if either agency determines that the Ocean Dumping Criteria are not met.

The SF-DODS SMMP is contained within the Final Site Designation Rule, but the SMMP Implementation Manual (USEPA 1998) is the primary vehicle for addressing new technology, making changes resulting from site monitoring, and incorporating other improvements. The SMMP sets forth the conditions under which SF-DODS may be used, including the disposal target area, acceptable sea state for transit to the site, scow loading requirements, monitoring and reporting requirements.

Monitoring activities conducted pursuant to the requirements of the SF-DODS SMMP have shown that the SF-DODS is in compliance with the general and specific site designation criteria and is performing as predicted in the site designation EIS.

## 5.5.2 SF-DODS Monitoring

The SF-DODS SMMP contains general guidelines for monitoring; specific measures are found in the SMMP Implementation Manual. The SMMP Implementation Manual is reviewed periodically and updated as necessary. Data are collected in accordance with a three-tiered monitoring program, which consists of three types of monitoring for each tier: physical, chemical and biological. Site monitoring is required only during years when disposal occurs. Costs are borne by the dredging project proponents but may be shared in the event that more than one project uses SF-DODS in a single year.<sup>3</sup> USEPA provides management oversight and is responsible for periodic confirmatory monitoring.

### Monitoring at SF-DODS

- Material testing for suitability determination is a key component of site monitoring
- Suitability testing is tiered
- Confirmation sampling of the disposal environs is required
- Cost of monitoring is borne by the project

### 5.5.2.1 Tiered Monitoring Activities

#### *Tier 1 Monitoring Activities*

Tier 1 monitoring includes physical surveys to determine the areal extent and thickness of the dredged material and to determine if any dredged material has been deposited outside the SF-DODS boundary. Chemical monitoring activities consist of collecting, processing and preserving samples of seafloor sediments so that the samples can be analyzed in the appropriate tier. Samples are collected in the dredged material “footprint”<sup>4</sup> outside the footprint, and outside the disposal site boundary. Samples from within the footprint are analyzed for contaminants of concern, while samples from outside the footprint and outside the SF-DODS are archived for possible evaluation in Tier 2. Biological monitoring activities in Tier 1 include regional surveys of seabirds, marine mammals and mid-water-column fish populations. Surveys include annual regional and periodic (random) shipboard surveys of birds and marine mammals. Tier 1 benthic monitoring consists of collection and preservation of samples of benthic communities for possible analysis in Tier 2.

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3 The SMMP Implementation Manual includes details regarding site monitoring funding mechanisms.

4 The Tier I physical monitoring delineates the dredged material footprint.



### *Tier 2 Monitoring Activities*

Tier 2 physical monitoring consists of oceanographic studies intended to validate and/or improve the models used to predict dispersion in the water column and deposition of dredged material on the seafloor at SF-DODS. Chemical monitoring in this tier consists of analyses of the samples collected in Tier 1 from outside the dredged material footprint. Tier 2 pelagic biology monitoring includes supplemental surveys similar to those described in Tier 1. Benthic monitoring in Tier 2 involves a comparison of the benthic community within the dredged material footprint to communities outside the footprint. An approximate time-series (ordinal) and community analysis are performed using data collected, during the current and previous years, to determine whether adverse changes in benthic populations outside the disposal site may endanger the marine environment.

### *Tier 3 Monitoring Activities*

Tier 3 physical monitoring consists of sophisticated analyses of dredged material dispersion and deposition on the sea floor. Activities may include additional, intensified studies with further sampling stations, greater frequencies, or more advanced testing methodologies and equipment. Chemical monitoring in Tier 3 includes analysis of tissue samples of field collected benthic and epifaunal organisms to evaluate the potential that material disposed of at SF-DODS results in unacceptable levels of bioaccumulation in the marine environment. Biological monitoring in Tier 3 involves advanced studies of seabirds, marine mammals and mid-water-column fish to evaluate how these populations might be affected by disposal site use. Studies may include evaluation of sublethal, chronic changes, such as lesions and decreased fecundity. Benthic surveys in Tier 3 include advanced studies of seafloor communities to evaluate how these populations might be affected by site use.

### *Reporting Requirements*

The results of the annual (if appropriate) monitoring (one, two or three tiers, as pertinent) are compiled in reports that are available for public review.

#### 5.5.2.2 Selection of Monitoring Tier

Tier 1 physical monitoring is adequate when the results of Tier 1 surveys establish that no significant amount of dredged material has been deposited or transported outside the disposal site boundaries. Tier 2 or Tier 3 physical monitoring is required when Tier 1 data are insufficient to conclude that a significant amount of dredged material is not deposited outside of SF-DODS. For the purposes of the SF-DODS SMMP, a “significant amount of dredged material” is defined as a thickness of 5 centimeters, although a lesser amount of accumulation may be considered significant if disposal and/or deposition of dredged material outside the SF-DODS boundary is shown to endanger marine resources.

Chemical monitoring is limited to Tier 1 analyses when Tier 1 physical monitoring indicates that a significant amount of dredged material has not been deposited or transported out of the disposal

site, and Tier 1 chemical monitoring establishes that dredged material deposited at the SF-DODS does not contain levels of chemical contaminants that are substantially elevated above the range of levels found in regional sediments. Tier 2 chemical monitoring must be undertaken if the results of Tier 1 monitoring indicate that a significant amount of dredged material has been disposed of or transported off the SF-DODS. If Tier 2 analyses are insufficient to establish that dredged material deposited at the disposal site do not contain levels of chemical contaminants that are significantly elevated above the range of chemical contaminants determined to be suitable for ocean disposal, Tier 3 chemical monitoring is required.

Tier 2 or 3 pelagic community monitoring is necessary if results from previous tiers are insufficient to establish that disposal at SF-DODS does not endanger the pelagic communities of concern. Tier 2 benthic monitoring is required if physical monitoring indicates that a significant amount of dredged material has been deposited or transported outside of the disposal site. Tier 3 benthic surveys must be undertaken when Tier 2 chemical analyses establish that significant bioaccumulation occurs in organisms sampled from the SF-DODS.

#### 5.5.2.3 Periodic Confirmatory Monitoring

Confirmatory monitoring is undertaken on an as-needed basis and at least once every three years, at least initially. This monitoring includes bioassay testing of sediments from within the dredged material footprint, consistent with the Green Book to confirm that only suitable dredged sediment is being disposed of at SF-DODS. In addition, near-surface arrays of appropriate organisms are deployed in and around the disposal site to confirm whether substantial bioaccumulation occurs in the water column as a result of multiple disposal events.

#### 5.5.3 Management and Monitoring Costs

Monitoring of SF-DODS is required only when it has been used for disposal of dredged material. Site users are responsible for funding the monitoring. In general, costs have ranged from approximately \$750,000 to \$1,000,000 per year. Appendix L contains a detailed breakdown of these costs.

### 5.6 BENEFICIAL REUSE SITE MANAGEMENT AND MONITORING

Management and monitoring of beneficial reuse sites will be developed on a case-by-case basis and will be site specific. It is probable that this will continue until a knowledge base is developed that will allow general guidance to be written. The SMMP work group, described in Section 5.4.4, above, will discuss developing such general guidance after development of SMMPs for the in-Bay disposal sites is completed.

The management and monitoring plans that will be required for the Montezuma, Hamilton and Bel Marin Keys wetland restoration projects are expected to provide background information and practical experience that can be used to produce guidance for future projects. These plans will build on the experience gained from previous wetland restoration projects in San Francisco Bay, including Sonoma Baylands. Lessons learned from the beneficial reuse projects at Winter and Sherman Islands will also be considered in developing monitoring and management plans for beneficial reuse projects. These plans will also incorporate the appropriate information from the permits issued by SFBRWQCB, the Central Valley Regional Water Quality Control Board (CVRWQCB), and the USACE for wetland creation and restoration projects that have not used dredged material.

**Monitoring at Beneficial Reuse Sites**

- Management and monitoring for beneficial reuse sites will be established through the permitting process
- Guidance will be based on lessons learned from past activities